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Building & Highway Material Testing Laboratory

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Job No.: CTCE/BBMP/W.No.10/NMSK/WMM/Gradation/2016-17

06.06.2016

GRADATION FOR WMM

MORTH TABLE-400-11

Client : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : **Mr. N.M. Shiva Kumar,**
#7, 2nd Bock, Juganahalli, Rajajinagara, Bangalore.

Name of Work : Improvements to roads and drains of Somanna Matta road in Chamundeshwari Layout in Ward No.10 (Doddabommasabdra), Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : EE/BTP/BBMP/E-PMT/304/2015-16 Dated: 23.03.2016

Date of Testing : 06.06.2016

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): **5000**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	150	150	3.0	97.0	95-100
22.4	1605	1755	35.1	64.9	60-80
11.2	925	2680	53.6	46.4	40-60
4.75	650	3330	66.6	33.4	25-40
2.36	600	3930	78.6	21.4	15-30
0.600	400	4330	86.6	13.4	8-22
0.075	520	4850	97.0	3.0	0-8

Note:

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Job No.: CTCE/BBMP/W.No.10/NMSK/WMM/AIV/2016-17 06.06.2016

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. N.M. Shiva Kumar,** #7, 2nd Bock, Juganahalli, Rajajinagara, Bangalore.
Name of the Work	Improvements to roads and drains of Somanna Matta road in Chamundeshwari Layout in Ward No.10 (Doddabommasabdra), Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/304/2015-16 Dated: 23.03.2016
Source / Location	WMM Plant
Type of Mix	Wet Mix macadam
Date of Testing	06.06.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	382	384	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	80	82	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	302	302	
4	Aggregate Impact value = percent fines	20.94	21.35	
	100* (W_2/W_1)%			21.34

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

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Job No.: CTCE/BBMP/W.No.10/NMSK/WMM/S-T/2016-17 06.06.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. N.M. Shiva Kumar,** #7, 2nd Bock, Juganahalli, Rajajinagara, Bangalore.
Name of Work	Improvements to roads and drains of Somanna Matta road in Chamundeshwari Layout in Ward No.10 (Doddabommasabdra), Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/304/2015-16 Dated: 23.03.2016
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	06.06.2016

Result : Flakiness Index = **11.35%**

Elongation Index = **13.30%**

Result : Combined Flakiness & Elongation index **24.65%**

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

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T-2377

Job No: CTCE/BBMP/W.No.10/NMSK/CSR-05/029d/SDBC(QB)/2016-17 10.06.2016

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

*CUSTOMER	:	**Asst. Executive Engineer**, Vidyaranyapura Sub Division, BBMP, Bangalore.
*AGENCY	:	**Mr. N.M. Shiva Kumar,** #7, 2nd Bock, Juganahalli, Rajajinagara, Bangalore.
*NAME OF THE WORK	:	Improvements to roads and drains of Somanna Matta road in Chamundeshwari Layout in Ward No.10 (Doddabommasabdra), Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	:	EE/BTP/BBMP/E-PMT/304/2015-16 Dated: 23.03.2016
*SAMPLE ID	:	Bitumen
DATE OF SAMPLING	:	08.06.2016
PERIOD OF TESTING	:	08.06.2016 to 10.06.2016

The results of the tests conducted on the bitumen sample using for Semi Dense Bituminous Concrete.

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 ^{0}C, 1/10 mm	IS :1203 -1978 (RA-2009)	86	80 to 100
2	Softening point, ^{0}C	IS :1205 -1978 (RA-2009)	45	Min. 40
3	Ductility at 27^{0}C, cm	IS :1208 -1978 (RA-2009)	100 >	Min.75
4	Flash Point, ^{0}C	IS :1209 -1978 (RA-2009)	304	Min. 220

*Information is furnished by the Customer/Representative.

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VISHWANATH C.
Quality Manager

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Job No.: CTCE/BBMP/W.No.10/NMSK/SDBC/AIV/2016-17 10.06.2016

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. N.M. Shiva Kumar,** #7, 2nd Bock, Juganahalli, Rajajinagara, Bangalore.
Name of the Work	Improvements to roads and drains of Somanna Matta road in Chamundeshwari Layout in Ward No.10 (Doddabommasabdra), Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/304/2015-16 Dated: 23.03.2016
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	10.06.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	380	381	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	78	79	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	302	302	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	20.53	20.73	**20.63**

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/W.No.10/NMSK/SDBC/Shape_T/2016-17 10.06.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. N.M. Shiva Kumar,** #7, 2nd Bock, Juganahalli, Rajajinagara, Bangalore.
Name of Work	Improvements to roads and drains of Somanna Matta road in Chamundeshwari Layout in Ward No.10 (Doddabommasabdra), Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/304/2015-16 Dated: 23.03.2016
Technical Reference	IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	10.06.2016

Result : Flakiness Index = **12.98%**

Elongation Index = **13.90%**

Result : Combined Flakiness & Elongation index **26.88%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.10/NMSK/SDBC/Stripping/2016-17 13.06.2016

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. N.M. Shiva Kumar,** #7, 2nd Bock, Juganahalli, Rajajinagara, Bangalore.
Name of the work	Improvements to roads and drains of Somanna Matta road in Chamundeshwari Layout in Ward No.10 (Doddabommasabdra), Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/304/2015-16 Dated: 23.03.2016
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	13.06.2016

Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.3	3.33	96.67
2	3.2		
3	3.5		

Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/W.No.10/NMSK/SDBC/Sp_Wa/2016-17 13.06.2016

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. N.M. Shiva Kumar,** #7, 2nd Bock, Juganahalli, Rajajinagara, Bangalore.
Name of the Work	Improvements to roads and drains of Somanna Matta road in Chamundeshwari Layout in Ward No.10 (Doddabommasabdra), Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/304/2015-16 Dated: 23.03.2016
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	13.06.2016

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2021	2022	2023	
2	Weight of basket suspended in water	W_2 g	750	750	750	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1271	1272	1273	
4	Weight of saturated surface dry aggregate in air	W_3 g	2019	2020	2022	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	748	748	749	
6	Weight of oven dried aggregate	W_4 g	2000	2008	2005	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.674	2.684	2.677	2.678
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.743	2.728	2.739	2.737
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.95%	0.60%	0.85%	0.80%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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Job No.: CTCE/BBMP/W.No.10/NMSK/SDBC/AGG/2016-17 13.06.2016

Aggregate Gradation Test

IS : 2386 Part I

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. N.M. Shiva Kumar,** #7, 2nd Bock, Juganahalli, Rajajinagara, Bangalore.
Name of the Work	Improvements to roads and drains of Somanna Matta road in Chamundeshwari Layout in Ward No.10 (Doddabommasabdra), Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/304/2015-16 Dated: 23.03.2016
Sample I / D	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete (SDBC)
Date of Testing	13.06.2016

Total Weight of Sample: **5650** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	450	8.0	7.96	92.04	90-100	
4.75	2970	52.6	60.53	39.47	35-51	
2.36	785	13.9	74.42	25.58	24-39	
1.18	450	8.0	82.39	17.61	15-30	
0.3	380	6.7	89.12	10.88	9-19	
0.075	320	5.7	94.78	5.22	3-8	

Total Weight of Sample: **5600** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	365	6.5	6.52	93.48	90-100	
4.75	2960	52.9	59.38	40.63	35-51	
2.36	625	11.2	70.54	29.46	24-39	
1.18	430	7.7	78.21	21.79	15-30	
0.3	340	6.1	84.29	15.71	9-19	
0.075	480	8.6	92.86	7.14	3-8	

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Job No.: CTCE/BBMP/W.No.10/NMSK/SDBC/Stability/2016-17 13.06.2016

TEST REPORT ON STABILITY OF MIX

Customer	:	**Asst. Executive Engineer**, Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	:	**Mr. N.M. Shiva Kumar,** #7, 2nd Bock, Juganahalli, Rajajinagara, Bangalore.
Name of the Work	:	Improvements to roads and drains of Somanna Matta road in Chamundeshwari Layout in Ward No.10 (Doddabommasabdra), Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	:	EE/BTP/BBMP/E-PMT/304/2015-16 Dated: 23.03.2016
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Semi Dense Bituminous Concrete
Date of Testing	:	13.06.2016

The results of the tests conducted on the bituminous concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-16)
1	Marshal Stability, Kn	8.20	8.45	8.2 Kn (min)
2	Marshal flow, mm	2.55	3.010	2 – 4
3	Percent air voids in Mineral Aggregate	3.25	3.60	3 – 5
4	Voids in Compacted Mix	13.10	13.90	13 – 15
5	Percent Voids filled with Bitumen	66.85	66.90	65 - 78
6	Density, g/cc	2.26	2.27	--

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